



EFFECT OF FARM POWER SOURCES ON POULTRY PRODUCTION IN OGUN STATE, NIGERIA

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ABSTRACT

The study examined the effect of farm power sources on poultry production in Ogun State, Nigeria. The Objective of the research were to describe the socio – economic characteristics of the respondents, identify the farm power sources available to the poultry farmers and the operations where they are utilized, estimate the cost associated with the utilization of each of the farm power source identified, determine the factors that influence the choice of farm power source and determine the effect of farm power source on Poultry production. Data was collected from randomly selected 120 poultry farmers using well-structured questionnaire. Data were analysed using Descriptive statistics, cost estimate, linear regression and Multi-variate Probit. Respondents were asked questions that had to do with their socio – economic characteristics, inputs, farm power sources used. The results showed that the mean age, farming experience and household size was 41 years, 10 years and 6 persons respectively. The amount spent monthly on power sources were Electrical ₦15608, Human ₦16900, Solar ₦10508, Wind ₦858, Mechanical ₦5592. The regression analysis revealed that factors that influence the choice power positively includes Age ($P<0.10$), income from other sources ($P<0.01$), labour ($P<0.05$), farm income and cost of production ($P<0.01$) and negatively include marital status ($P<0.05$) with an R^2 of 0.9805. Multivariate Probit analysis revealed the factors influencing the choice of farm power positively include Electricity (cost of electricity $P<0.01$), Mechanical (cost of machinery $P<0.01$), Solar (farm experience and education cost $P<0.05$) and negatively include Electrical (farm experience $P<0.10$), Mechanical (farm distance $P<0.10$) model χ^2 (3) to be 3. 47947. The study has shown that farmers who use various farm power sources available to them have higher productivity than those that do not use. Government should help poultry farmers in getting other sources of farm power available to the farmers such as the biogas, wind, biomass and so many others which will increase the productivity of the farm and income of the nation.

Keywords: Effect, Farm power, Poultry, Production, Utilization.

INTRODUCTION

Farm power utilization refers to the amount of energy used in a farm. There is a dynamic situation in which human and animal power is being replaced by mechanical power, but in others, farmers have to give up mechanical and animal power and revert back to human power (Clarke and Bishop, 2002). Power is needed on the farm for operating different tools, implements and during various farm operations. While mobile power is used for doing different field jobs, the stationary power is used for lifting water and operating irrigation equipment; operating threshers, shellers/deorticators, cleaners, graders and for other post-harvest operations. The mobile farm power comes from human, draught animals, power tillers, tractors and self-propelled machines, whereas the stationary power is obtained from oil engines (diesel, petrol, kerosene) and electric motors. Availability of adequate farm power is



very crucial for timely farm operations for increasing production and productivity and handling the produce to reduce losses. The productivity of farms depends greatly on the availability and judicious use of farm power by the farmers (Singh *et al.*, 2014). The composition of farm power from different sources needs to be properly balanced to meet of its timely requirements for various farm operations. Human energy is predominantly used for all operations in agriculture. Before green revolution, animate energy had been widely used for various farm operations like seedbed preparation, sowing, inter-cultivation, harvesting, threshing and transportation to and from the field. Poultry production is mainly committed to the continuous feeding of the people in the world. In West Africa, Poultry production of broilers for meat purpose alone increased from 694000 in April 2012 to 727000 in June 2013 being a gross level of 22% of the world population (Theobela, 2014). The increase for poultry meat and egg as source of animal protein required by people led to an increase in its production by 37kg in 2012, this in turn has led to rise in income of the population (Freeman and Ellis 2005). Poultry production is generally accepted by ethnic groups and religions in Nigeria, for this reason no religion taboo is associated with it unlike other livestock which has led to a big increase in the demand for poultry chicken meat and eggs (Javier, 2013). According to Aklilu *et al.* (2007) even as farmers build up their asset base, poultry is considered to be an important means to reduce vulnerability. Poultry production needs different sources of farm power to carry out various activities like brooding of the chicks, incubating of eggs, hatching of the eggs, feed formulation.

According to Phaniraja and Panchasara (2009), despite its growing popularity of farmers' adoption of dung and urine as indirect source of energy, as farmyard manure and biogas production., farmers face several constraints such as rapid plough/share wear, high draught force and poor design of harness and other implements.

There is limitation of people to different available source of power in poultry production and in due of this, therefore attempts to solve this problem is necessary. There is high cost in the use of sources for farm power; therefore this research tends to identify farm power sources with low cost. Production is low due to poor supply of farm power, this study tends to identify other sources of farm power and increase productivity. Custom hiring of tractors by co-operative societies and individual farmers has been becoming popular for tillage, sowing, planting, harvesting, threshing and transport (Singh *et al.*, 2013).

The broad objective of the study was to determine the effect of farm power sources on poultry production in Ogun State Nigeria. The specific objectives were to:

- i. describe the socio-economic characteristics of the respondents;
- ii. identify the farm power sources available to the farmers (Poultry) and the operations where they are utilized;
- iii. estimate the cost associated with the utilization of each of the farm power source identified;
- iv. determine the factors that influence the choice of farm power source and
- v. determine the effect of farm power source on Poultry production.

Singh *et al.* (2013) reported that farm mechanization is dependent mainly upon the size of land holding, sources and availability of farm power. The pattern of farm size distribution in Punjab has been changing differently than in India mainly because of the differences in the mechanization of agriculture and the development of custom hiring services. The total land holdings declined from 13.75 lakh in 1970-71 to 10.52 lakh in 2010-11.

Singh (1999) reported that in India, the average command area was 3.67 ha per animal-pair. This is due to need of timely and precisely application of crop production inputs considered as important factors to maximize return on input investments, increased cropping



intensity and less availability of time between successive crops. Also, more fatigue and increased cost of maintenance of draught animals has been a main cause of this trend to the extent that additional need of farm power is being met through other sources of power like mechanical and electrical.

MATERIALS AND METHODS

The Study Area

The study was carried out in Ogun State which was founded 1976. It is an inland state in the south western Nigeria with its capital in Abeokuta. The state has a land mass of an area of 16,980.55 square kilometres. According to the Nigerian population commission in year 2006, it has the population of about 3,751,140. Ogun State is located between the coordinates of $7^{\circ}00'N$, $3^{\circ}35'E$. It is bounded in the north partly by Oyo and Osun State, in the south by Lagos State, in the east by Ondo State and west by Republic of Benin. The average daily temperature ranges between $25^{\circ}C$ to $35^{\circ}C$ almost throughout the year. Agriculture especially farming is the main occupation of Ogun State people. There are 20 Local Government Area (LGA) in Ogun State, among which 3 LGA was concentrated upon for the purpose of this research work.

Sampling Technique

A multi-stage sampling procedure was used to select the respondents of the study. The first stage involved the selection of three Local Government Areas (LGAs) of the State (Abeokuta North, Obafemi-Owode, and Ifo). The second stage involved random sampling of two villages in each of the LGA. The third stage involved random selection of poultry farmers in the selected LGA giving a sample size of 120 respondents.

Method of Data Collection

A well designed questionnaire and an interview schedule was administered to the respondents. Information concerning the socio-economic characteristics (gender, age, marital status, level of education, farming experience, farm size, household size, main occupation, farm production, type of farm power was elicited from the respondents.

Method of Data Analysis

- â Objective 1 and 2 were analysed using descriptive Statistics such as mean, median, percentage and frequency tables.
- â Objective 3 was analysed using cost of power estimation.
- â Objective 4 was analysed using Multivariate Probit.
- â Objective 5 was analysed using Regression model.

RESULTS AND DISCUSSION

Table 1 shows that (30.8 %) of the farmers falls within the range of 31 - 40 years with a mean of 41 years and this finding is in accordance with (Bunkunmi and Yusuf, 2015) who established in their findings that about (62 %) of respondents were within 21 - 40 years, also concluded that, respondents were in their productive and active age. More s(67.5 %) of the farmers were male, this is an indication that male dominated poultry production in the area, d this finding is in accordance with (Okoli *et al.*, 2004) who found out that about (60 %) of men were very involved in poultry production in order to supplement their income in Imo state.(67.5 %) of the farmers were married, (60 %) of the farmers have 1 - 5 range of persons per household with a mean of 6 persons, (79.2 %) of the farmers had tertiary education, meaning that majority of the farmers were literate.This is accordance with (Nkhori, 2004) who reported that on the average, household have five members.



Table 1: Distribution of the Respondents according to Age, Sex, Marital status, Education and Household size

Description	Frequency	Percentage (%)
Age (years)		
Less than or equal 20	1	0.8
21-30	26	21.7
31-40	37	30.8
41-50	31	25.8
51-60	18	15.0
61-70	7	5.8
Total	120	100
Mean = 41		
Sex		
Male	81	67.5
Female	39	32.5
Total	120	100
Marital status		
Single	26	21.7
Married	81	67.5
Divorced	13	10.8
Total	120	100
Household size (numbers)		
1-5	72	60
6-10	36	30
11-15	6	5
16-20	4	3.3
Greater than 20	2	1.7
Total	120	100
Mean		
6		
Education		
Primary	4	3.3
Secondary	8	6.7
Tertiary	95	79.2
Adult education	8	6.7
Non-formal	5	4.2
Total	120	100

Source: Field Survey, 2017

Table 2 shows that (60 %) of the framers were within the range of 1 – 10 years of experience, meaning most of the farmers are not well experienced in the poultry business and might not know how to manage the farm power sources in other to maximize profit. Also, (52.5 %) of the farmers were not involved in any secondary occupation indicating that the farmers were concentrating on their main occupation which is the poultry business. This conforms with Sani and Campbell (2010) that catfish farmers realized a net farm income of ₦203,103,500 and ₦1.88K as per naira invested.



Table 2: Years of Experience and Secondary Occupation of Respondents

Description	Frequency	Percentage
Years of farming experience		
1-10	72	60.00
11-20	35	29.20
21-30	11	9.20
31-40	2	1.70
Total	120	100
Mean = 10		
Secondary Occupation		
Yes	57	47.50
No	63	52.50
Total	120	100

Source: Field Survey, 2017

Table 3 reveals that (51.7 %) of the farmers raised layers, (85 %) of the farmers practiced intensive system in which the farm power source is more, the cost is high. This result is agreed with the research of (Bamiro, 2008) who said that raising point of lay birds for egg is a major source of income with extra income from spent layer and In the research of (Adebola and Adeola, 2005) whose result showed that (63 %) of the respondents engaged in layer birds' production.

Table 3: Distribution of the Respondents according to Types of Birds and Management System

Description	Frequency	Percentage
Poultry activities		
Type of birds		
Broiler	38	31.7
Layer	62	51.7
Cockerel	1	0.8
Turkey	14	11.7
Others	5	4.2
	120	100
Management system		
Intensive	102	85.0
Semi-intensive	18	15.
Total	120	100

Source: Field Survey, 2017

Table 4a shows the farm power sources identified by the respondents in poultry production which include (human, electricity, solar, mechanical, and wind). It also showed that (33.3 %) of the farmers use human and electricity as their source of farm power for poultry production. (55.8 %) of the power source was used in egg picking, (100 %) in sanitation of the environment and feeding of the birds while (90.8 %) was used in lighting of the pen this finding is in accordance with Lawrence and Clare (2002) who recognised that human are the most significant power source in Sub-Saharan Africa.



Table 4a: Sources of Farm Power and Utilization of the Respondents

Description	Frequency	Percentage
Source of power		
Human only	11	9.2
Human and Electrical	40	33.3
Human and Solar	6	5.0
Human, Electrical and Mechanical	31	25.8
Human, Electrical, Mechanical and Solar	10	8.3
Human, Electrical, Mechanical, Solar and Wind	6	5.0
Human, Electrical and Solar	9	7.5
Human, Mechanical and Solar	7	5.8
Total	120	100
Utilization of power		
Egg picking	67	55.8
Sanitation	120	100
Lightning	109	90.8
Feeding	120	100

Source: Field Survey, 2017

Similarly, Table 4b shows that (100 %) of the small scale farmers used human and electrical as their source of power while (20 %) of the large scale farmers used human, electrical, mechanical and solar for broiler production. It also revealed that for layer production, (100 %) of the small scale farmers used human and electrical as their source of power while (45.2 %) of the large scale farmers used human, electrical and mechanical as their source of power. It further revealed that for (40 %) cockerel and turkey production involved only small scale farmers and used human and electrical as source of power. Singh (1999) agreed with these findings that additional need of farm power is being met through other sources of power like mechanical and electrical.

Table 5a and 5b shows that the cost per month associated with the utilization of farm powers (electrical, human, solar, wind and mechanical power used in poultry production) and number of birds of the respondents the results revealed ₦15,608:00, ₦16,900:00, ₦10,508:00, ₦858:00, ₦5,592:00 as the total cost of using the five categories, respectively. This indicates that cost of human used in poultry production is high and that most farmers spend their income on it leading to a decrease in profit making for most of the farmers. (17.5 %) of the broiler farmers had a bird range of 1-1000, (25.8 %) of the layer farmers had a bird range of 1001-10,000 (0.8 %) of the cockerel farmer had a bird range of 1-1000 and (8.3 %) of the turkey farmer had a bird range of 1-1000.

Table 6 shows that factors that influence the choice of electricity power includes the cost of electricity and farmers experience which is positive, ($P < 0.01$) and negative, ($P < 0.10$), respectively, the factors that influence the choice of mechanical as source of power which includes cost of machinery and farm distance which is positive, ($P < 0.01$) and negative, ($P < 0.10$), respectively, the factors that influence the choice of solar power which includes farm experience and education which are positive ($P < 0.05$). This finding is in agreement with Sani and Campbell (2010) who, disclosed R^2 value of 67.3% implying that the variation in total output of catfish was determined by the explanatory variables (age, gender, family size, educational level, and marital status).



Table 4b: Sources of Farm Power and Number of Birds of the Respondents

	Broiler			
	Small scale farmers		Large scale farmers	
	Frequency	Percentage	Frequency	Percentage
Human	11	100	-	-
Human and electrical	40	100	-	-
Human and mechanical	6	100	-	-
Human, Electrical and Mechanical	31	100	-	-
Human, Electrical, Mechanical and Solar	8	80	2	20
Human, Electrical, Mechanical, Solar and Wind	9	100	-	-
Human, Mechanical and Solar	6	100	-	-
	Layer			
Human	10	90.9	1	9.1
Human and electrical	40	100	-	-
Human and mechanical	1	100	-	-
Human and Solar	6	100	-	-
Human, Electrical and Mechanical	17	54.8	14	45.2
Human, Electrical, Mechanical and Solar	7	70	3	30
Human, Electrical, Mechanical, Solar and Wind	6	100	-	-
Human, Electrical and Solar	9	100	-	-
Human, Mechanical and Solar	6	100	-	-
	Cockerel			
Human			-	-
Human and electrical			-	-
Human and mechanical			-	-
Human and Solar			-	-
Human, Electrical and Mechanical			-	-
Human, Electrical, Mechanical and Solar			-	-
Human, Electrical, Mechanical, Solar and Wind			-	-
Human, Electrical and Solar			-	-
Human, Mechanical and Solar			-	-
	Turkey			
Human	11	100	-	-
Human and electrical	40	100	-	-
Human and mechanical	1	100	-	-
Human and Solar	6	100	-	-
Human, Electrical and Mechanical	31	100	-	-
Human, Electrical, Mechanical and Solar	10	100	-	-
	6	100	-	-
Human, Electrical, Mechanical, Solar and Wind	9	100	-	-
Human, Electrical and Solar	6	100	-	-
Human, Mechanical and Solar	11	100	-	-

Source: Field Survey, 2017



Table 5a: Cost associated with the Utilization of Farm Power of the Respondents

Descriptions	Amount (₦)
Electrical	15608
Human	16900
Solar	10508
Wind	858
Mechanical	5592

Source: Field Survey, 2017

Table 5b: Cost associated with the Number of Birds of the Respondents

No of birds	Broiler		Layer		Cockerel		Turkey	
	Freq	%	Freq	%	Freq	%	Freq	%
Lower than 1	77	64.20	52	43.30	119	99.20	105	87.50
1-1000	21	17.5	13	10.8	1	0.8	10	8.3
1001-10,000	18	15.0	31	25.8	0	0	4	3.3
10,001- 20,000	2	1.7	6	5.0	0	0	1	0.8
20,001- 50,000	2	1.7	1	0.8	0	0	0	0
50,001-100,000	0	0	7	5.8	0	0	0	0
100001-500,000	0	0	10	8.3	0	0	0	0

Source: Field Survey, 2017

Table 6: Multivariate Probit Factors that influenced the choice of Farm Power

Variables	Electricity	Mechanical	Solar
No of birds	-0.55	0.49	0.61
Extension visit	0.32	-0.22	-0.06
Cost of labour	0.24	1.36	-0.28
Cost on machinery	-0.64	6.58*	0.17
Cost of electricity	4.85*	1.89	-0.62
Farm experience	-1.83***	0.79	2.23**
No of household size	0.02	1.22	1.44
Education	0.35	0.87	2.11**
Farm distance	1.57	-1.66***	-0.26
Amount of credit	0.35	0.21	0.48
Diagnostic statistics			
Constant	-0.79	-2.70	- 3.75
Model chi2 (3)	3.47947		

Note: *** = significant at 10 %, ** = significant at 5 % and * = significant at 1 %.

Source: Field Survey, 2017

Table 7 shows that age is positive ($P < 0.10$) marital status is negative and ($P < 0.05$) income and farm income is positive ($P < 0.01$) cost of production is positive ($P < 0.01$) which means that the higher the cost of production, labour is positive ($P < 0.05$). Adekoya and Miller (2004) reported that fish is the cheapest source of animal proteins. It has been established from economic point of view that, it is cheaper to farm or rear aquatic animals (fish) than terrestrial animals. When compared with livestock, it requires less space, time, money and has a higher feed conserving rate.



Table 7: Regression Results of the Effect of Farm Power Source on Poultry Production

Variables	Coefficients	T-value
Constant		
Age (X ₁)	948869.8	1.94***
Gender (X ₂)	-1609516	-0.13
Marital status (X ₃)	-3.80e+07	-3.17**
Education (X ₄)	1429035	1.17
Farming experience (X ₅)	302831.7	0.30
Number of birds (X ₆)	8.467931	0.10
Household size (X ₇)	-3473245	-1.01
Income from other sources (X ₈)	8.965101	3.74*
Labour (X ₉)	1.67e+07	2.68**
Farm income (X ₁₀)	0.8565133	9.44*
Cost of production (X ₁₁)	0.1335046	5.59*
Electricity (X ₁₂)	-1.16e+07	-0.97
Mechanical (X ₁₃)	-1.20e+07	-0.68
Solar (X ₁₄)	2.39e+07	1.58
Human (X ₁₅)	0 (omitted)	
Wind (X ₁₆)	-2295876	-0.07
Constant	-7.58e+07	-1.70
R ²	0.9805	
Adjusted R ²	0.9440	

Note: *** = significant at 10 %, ** = significant at 5 % and * = significant at 1 %.

Source: Field Survey, 2017

CONCLUSION AND RECOMMENDATIONS

The study concludes that farmers who used various farm power sources available to them have higher productivity than those that do not use. Most of the poultry farmers were mainly male and married and this gives them more influence in using the farm power and going into poultry production. It is further concluded that majority of the farmers were literate aiding them to be able to use the latest farm power available to them such as solar. The layer production is dominant in the study area and also intensive system was adopted in rearing of the birds which required more farm power for efficiency and quality. The protein requirement of the world can be met by using the various farm power sources for accuracy and timely production. Poultry production is less laborious due to use of different farm power source and, hence, allowing the youth to venture into the business. Based on the finding, the following recommendations were made:

- vi. Farmers should be more aware of the farm power sources available to them and how they can use the farm power judiciously to increase their productivity
- vii. Farmers should be educated more on poultry production so as to enable them use the resources they have to increase their productivity such as the waste product gotten from poultry can be used to generate power (Bio-gas).
- viii. Farmers should form a cooperative or group to enable them raise money to buy equipment which will aid the productivity of the farm and reduce the cost of production.
- ix. Government should invest in poultry production by reducing the cost of feed and producing quality feed with the right proportion of nutrient needed by the birds included.
- x. Government should help poultry farmers in getting other sources of farm power available to the farmers such as the biogas, wind, biomass and so many others which will increase the productivity of the farm and income of the nation.



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